



# Nuclide Charts and the Nuclide Explorer

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<http://www.nucleonica.net>



# Nuclides Charts

- A graphical tool to visualise physical properties of some nuclides chosen in some adequate database.
- Different kind of nuclide charts are available, but not all of them are reliable.
- Nucleonica provides two online chart tools:  
    Nuclide Explorer  
    Universal Nuclide Chart (Java applet)
- The “Karlsruhe Nuclide Chart”, an unique nuclide database



## From Nuclear Sciences to Nuclide Charts

- H.Becquerel 1896, discovery of radioactivity
- With Curie, Rutherford, Fermi, Hahn, Wigner, Bohr, Mottelson, many more advances in our knowledge of the nucleus structure  
Soddy, Moseley, De Hevesy ➡ isotopes
- Many Nobel prizes in Nuclear Science (including Physics, Chemistry, Physiology and Medicine)
- Since Gell-Mann, classification of hadrons with the quark model.  
Salam, Weinberg, Reines, Perl, Hooft, edification of the standard model
- Mendeleyev table (1869): Chemical properties, Mass Number
- Representation of nuclides in a proton/neutron map system (Fea, 1935, Seaborg, 1940, Segrè, 1945, Karlsruhe since 1958)



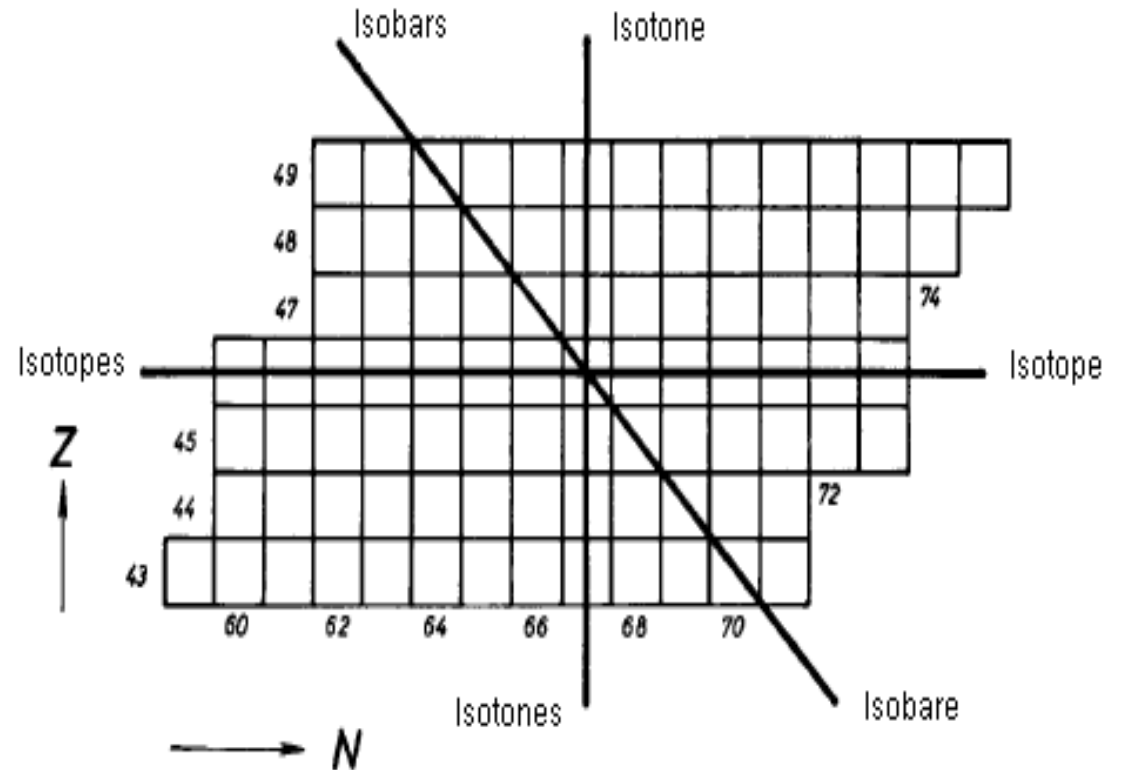
# The visualisation of the Nuclides

**Nuclide** : *A type of atom specified by its atomic number,  $Z$ , mass number,  $A$ , and energy state.*

**Isotopes** : *meaning at the same place in the periodic table ➡ nuclides with same  $Z$ .*


**Isotones** : *nuclides with the same  $N$  ( $=A-Z$ ).*

**Isobars** : *nuclides with the same  $A$ .*





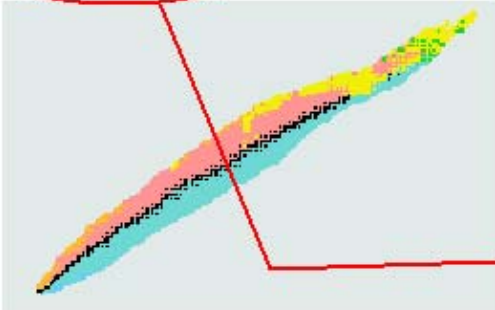
# Nucleonica Nuclide Charts



## ... web driven nuclear science

Applications | My Preferences | Help | New Alerts


### Nuclide Explorer



» Actual Chart: Karlsruhe

### Search Nucleonica Documentation

Nuclear Data Retrieval



### Application Centre

- » Mass Activity Calculator
- » Decay Engine
- » Dosimetry & Shielding
- » Range & Stopping Power
- » webKORIGEN
- » **Universal Nuclide Chart**
- » Transport & Packaging
- » Nuclide mixtures
- » Nucleonica Scripting
- » Library creation for 3rd party software
- » Extended Graph Module

### Data Centre

- » Physical Constants
- » Nuclide Datasheets
- » Nuclide Derived Data
- » Average Cross Sections
- » Radiations
- » Prompt Gamma
- » Fission Yields

### Welcome, Christophe

[Edit Preferences](#)  
[MyCommunity Portal](#)

#### My Last Nuclides

- 49 In107
- 2 He6
- 45 Rh91
- 28 Ni56
- 82 Pb200

#### My Nuclide Mixtures

- AAA
- AAA Decay Engine Result

#### My Sources

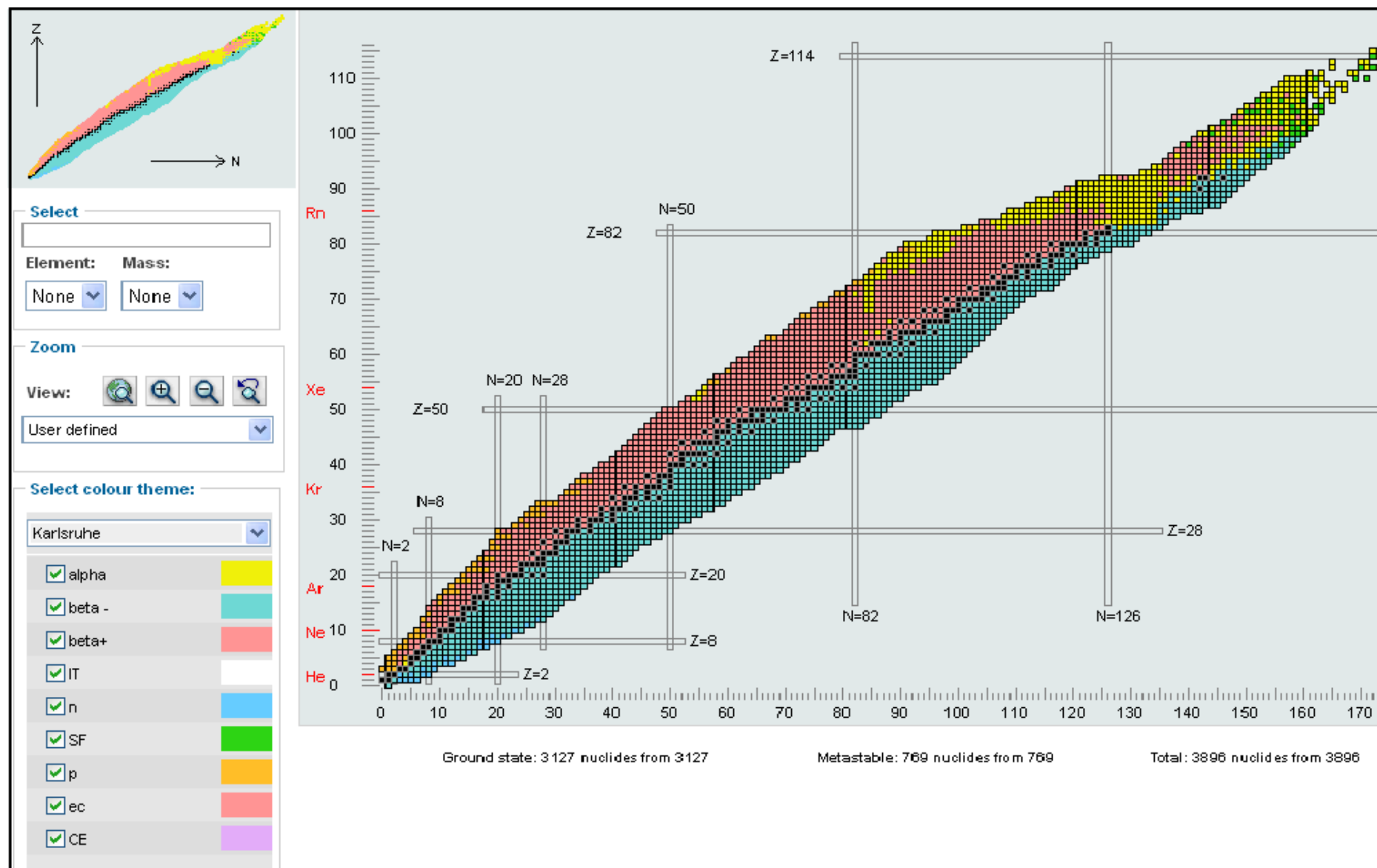
- goto

#### My Messages

- NAMLS-9 International Conference on Nuclear Analytical Methods in the Life Sciences
- Open positions at the University of Liège
- NEWM The next Nucleonica training course 25/26 October 2007, Karlsruhe

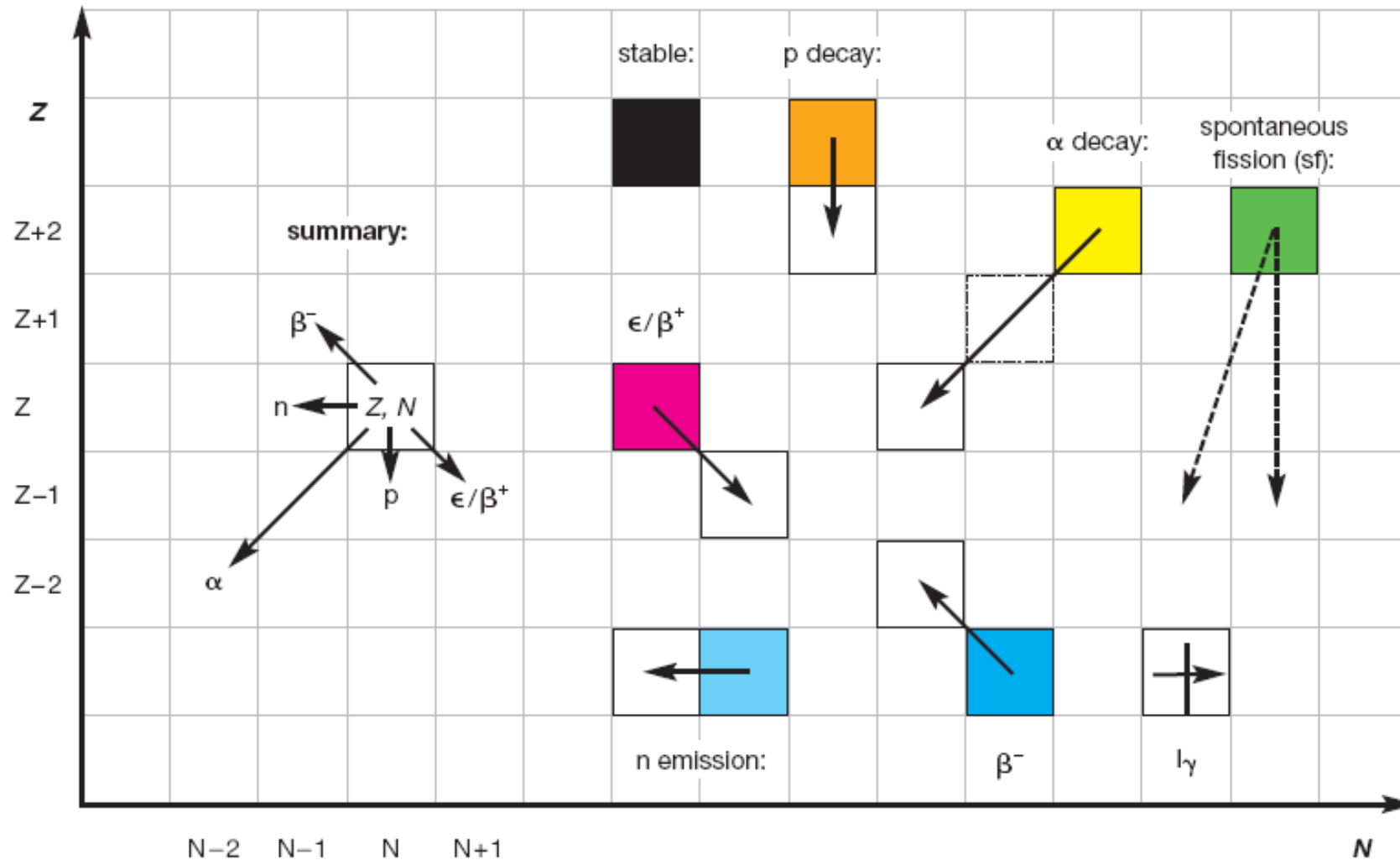


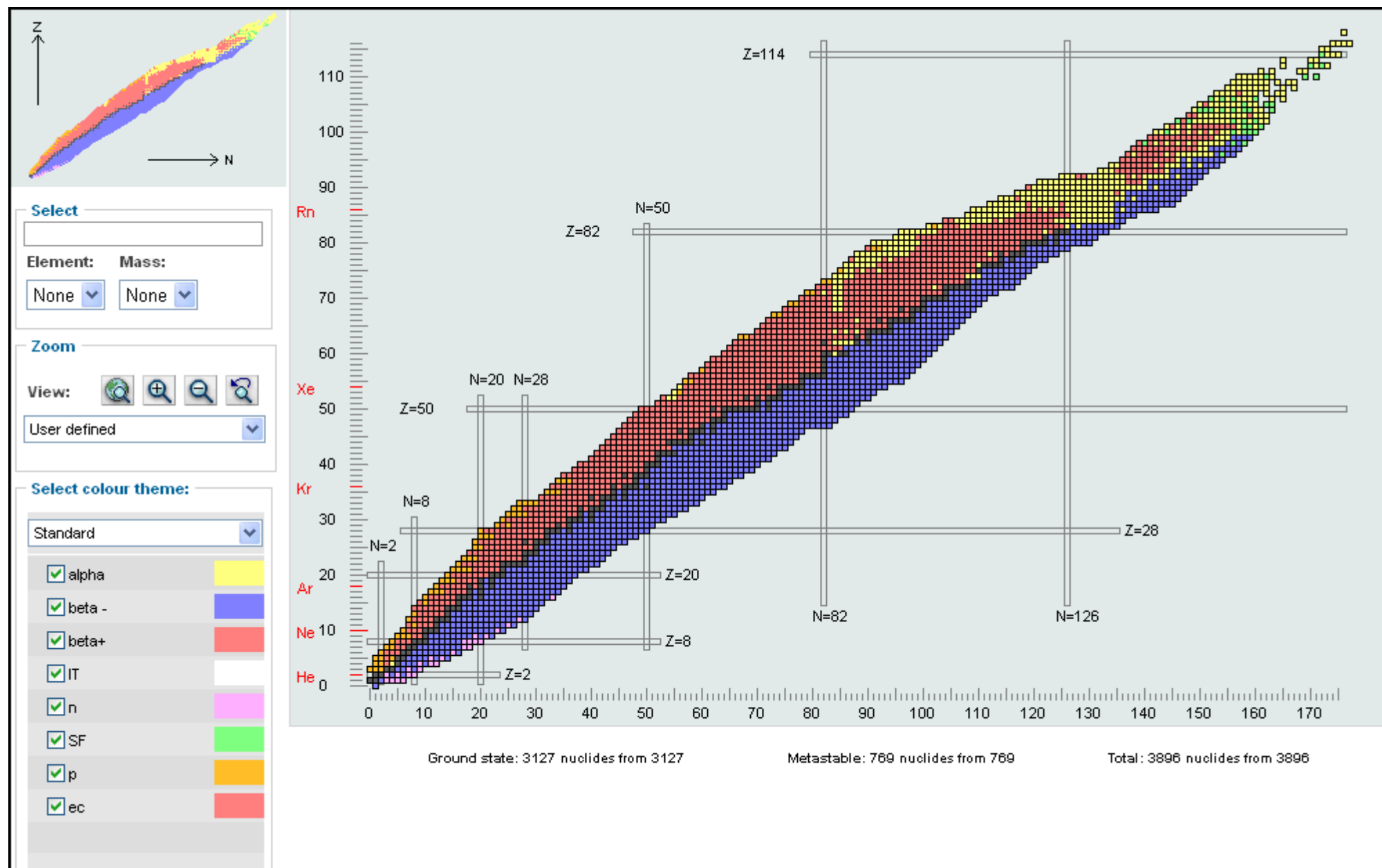
# Nucleonica Nuclide Explorer



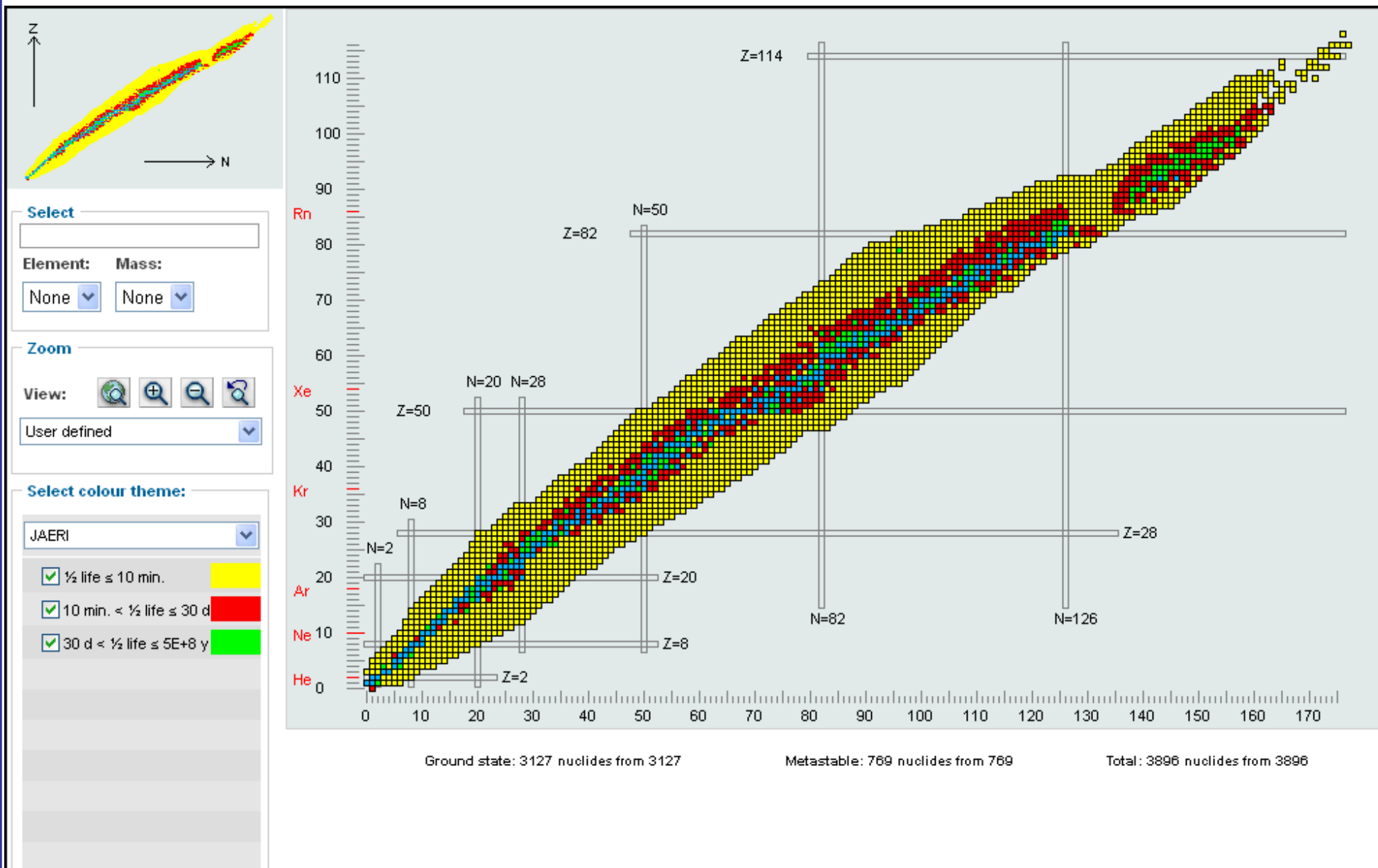


# Decay modes: chart convention



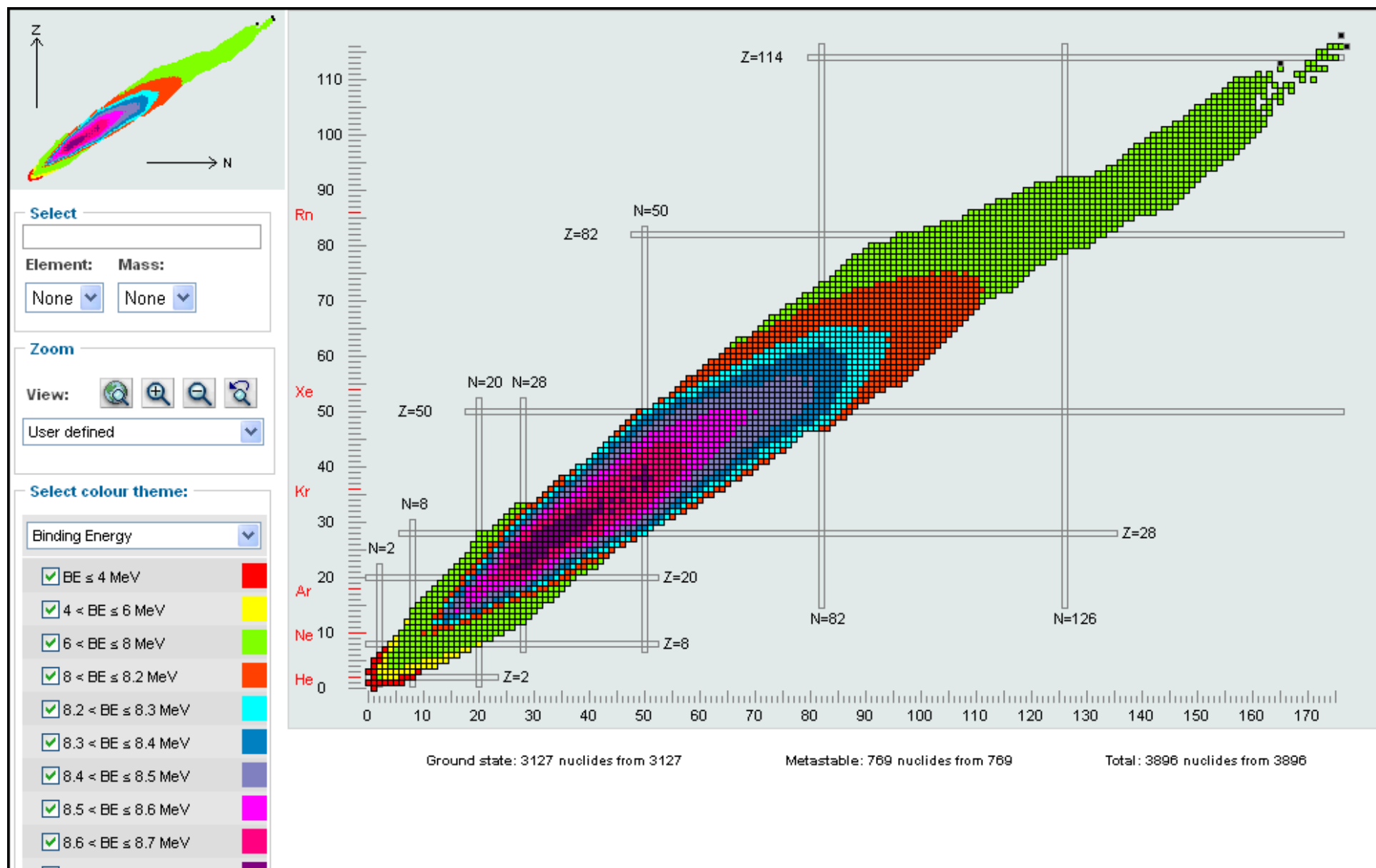


# Half-lives colour scheme (JAERI)

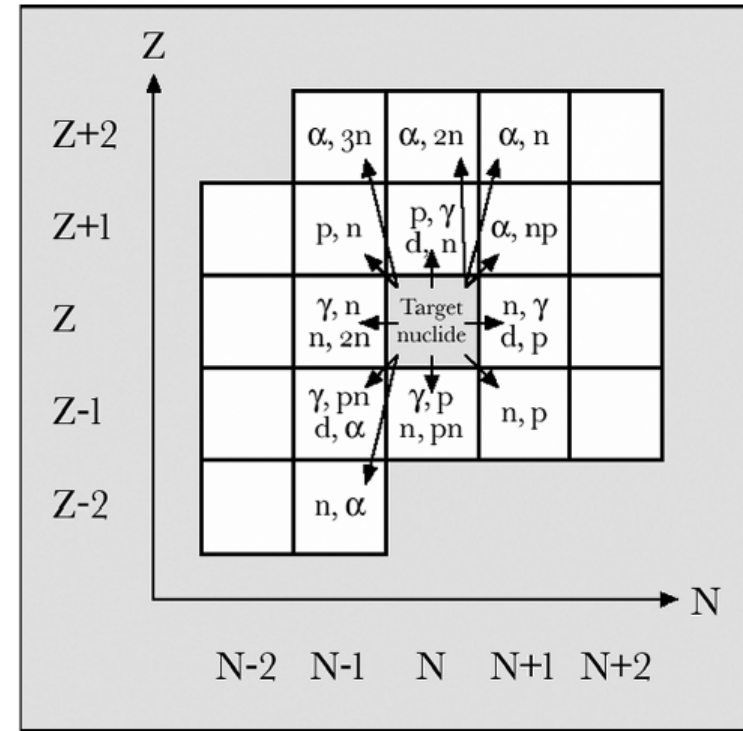
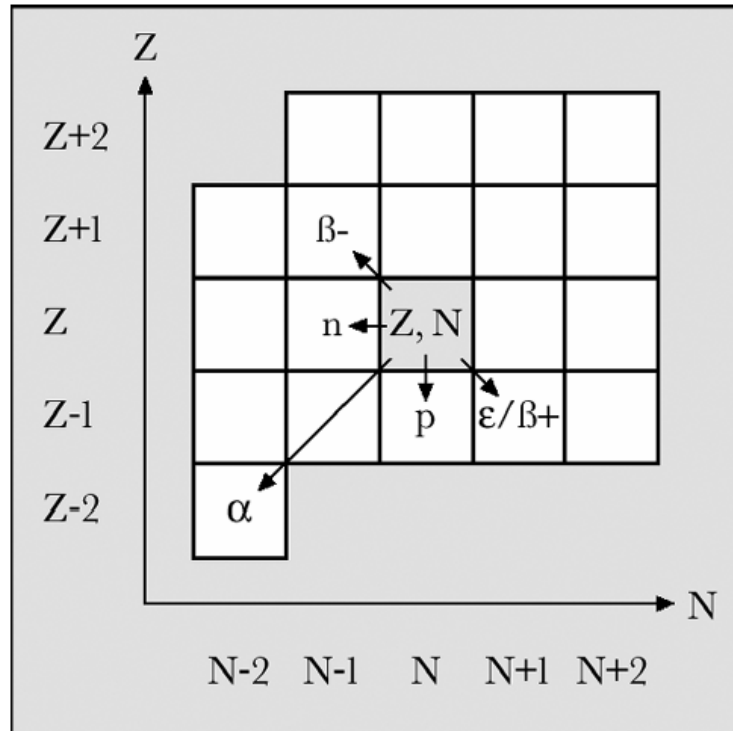




# Binding energy colour scheme



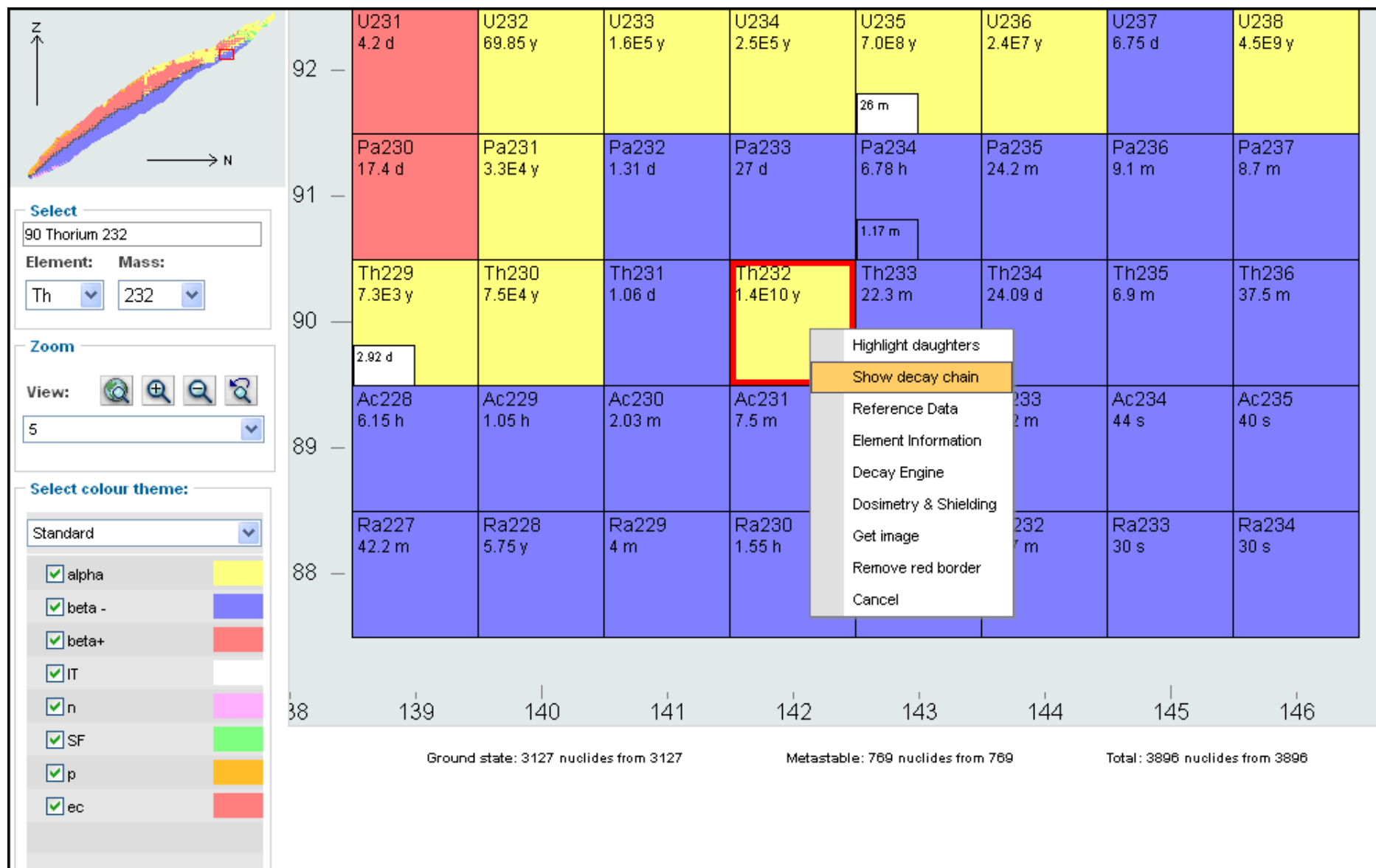
## Decay and nuclear reactions



Two important features of the chart

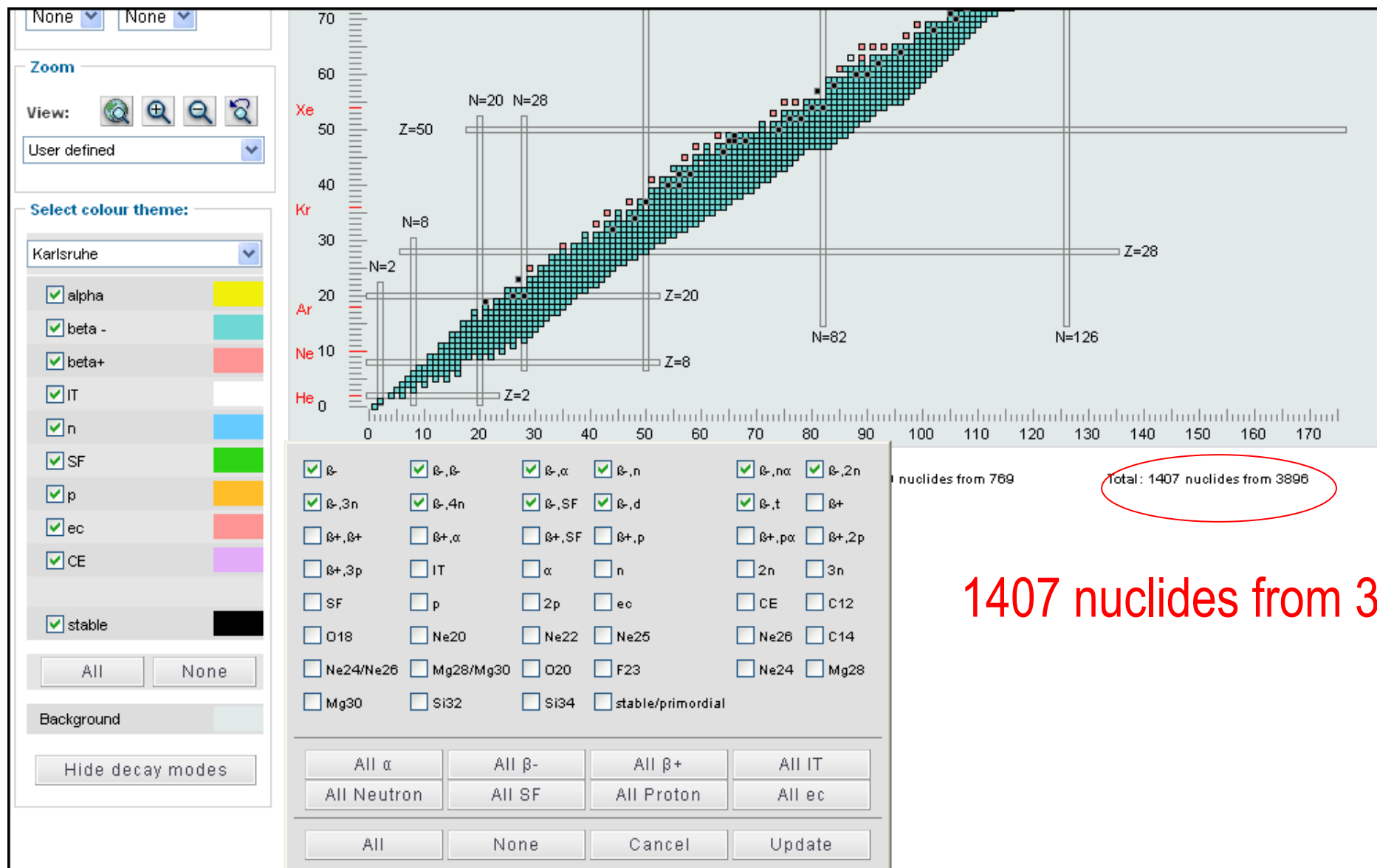


# Nuclide Explorer: access to data

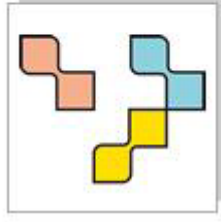




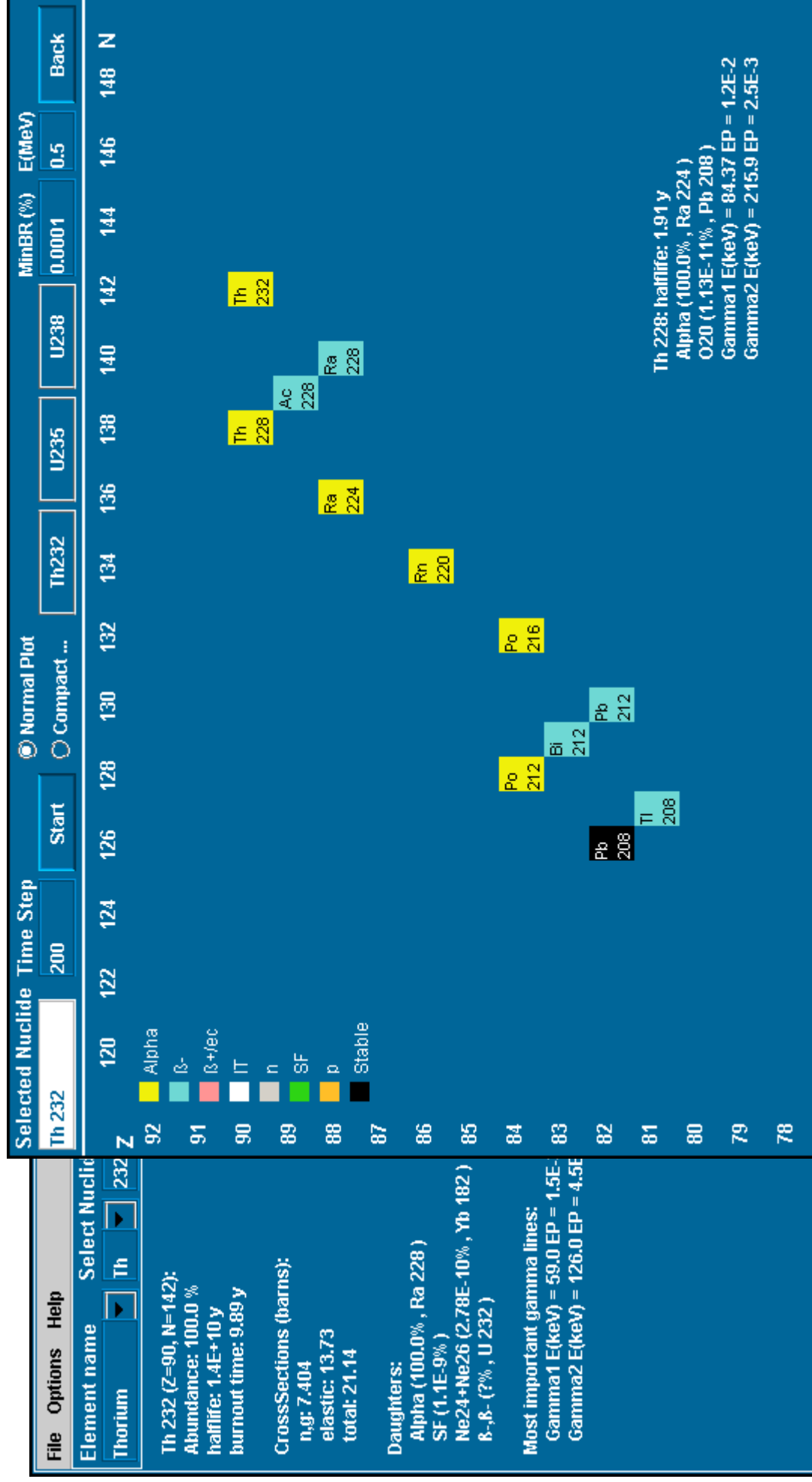
# Nuclide Explorer : filtering decay modes



1407 nuclides from 3896



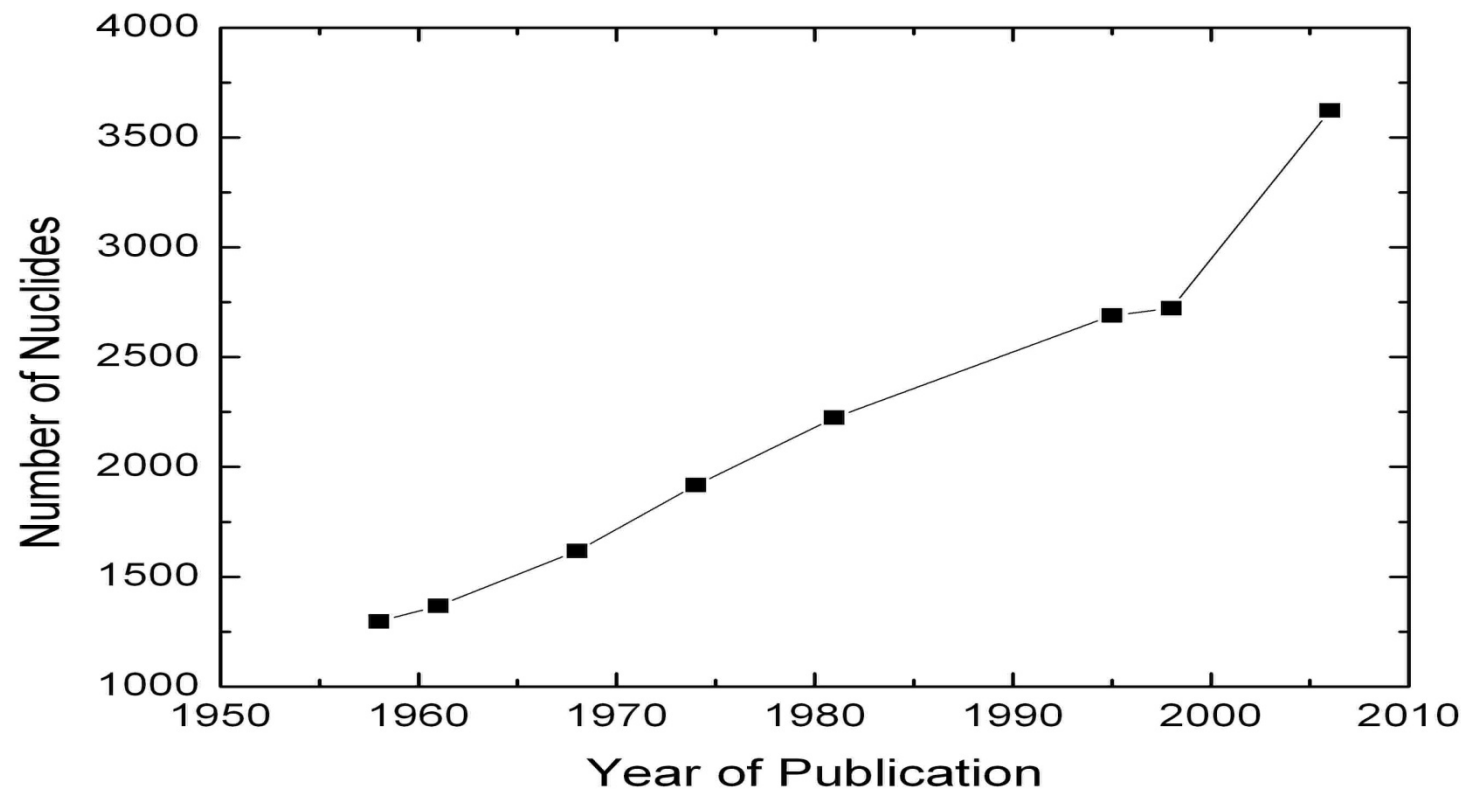
## Universal Nuclide Chart





## Discovery of New Nuclides

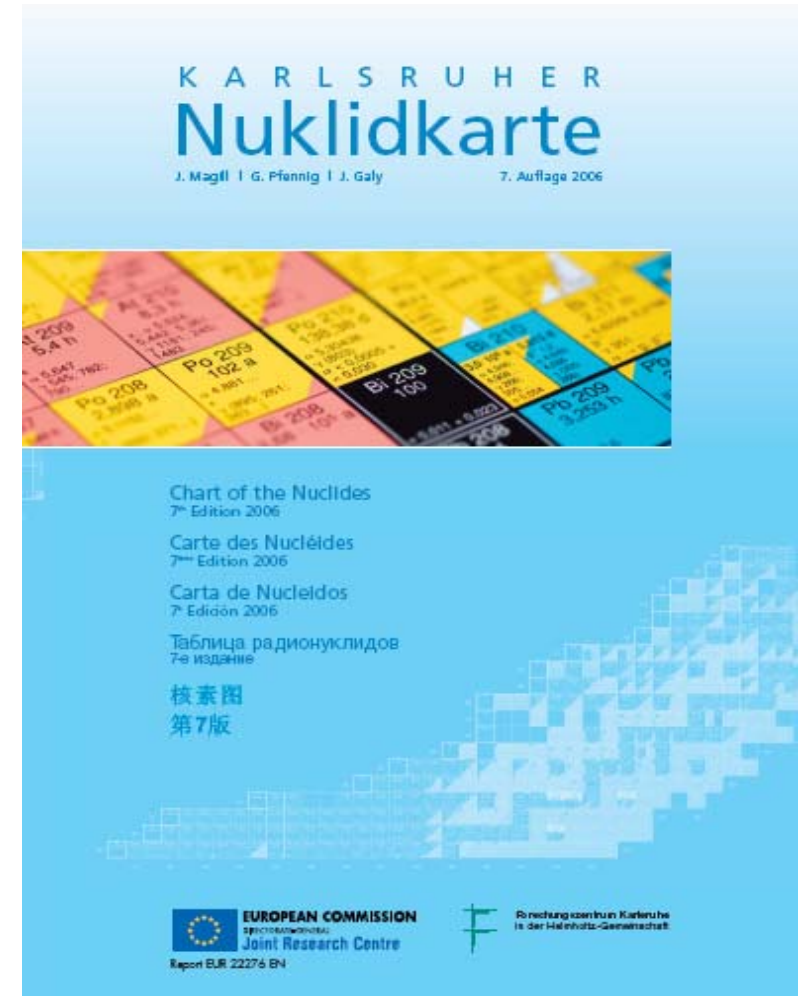
Number of Nuclides available in the Karlsruhe Nuclide Chart  
The 7 editions, including the 2006, are shown



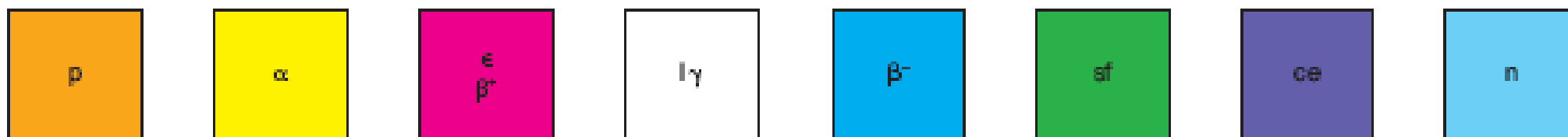
# New issue of the “Karlsruher Nuklidkarte” **Karlsruher Nuklidkarte 2006 7<sup>th</sup> edition,** G. Pfennig, J. Magill, J. Galy.

New nuclides and updates to  
known nuclides

- ➡ 612 updated nuclides
- ➡ Brochure with explanation in 6 different languages; English, German, French, Spanish, Russian and Chinese.
- ➡ Restricted but essential information shown



## Karlsruhe Nuclide Chart: an unique database

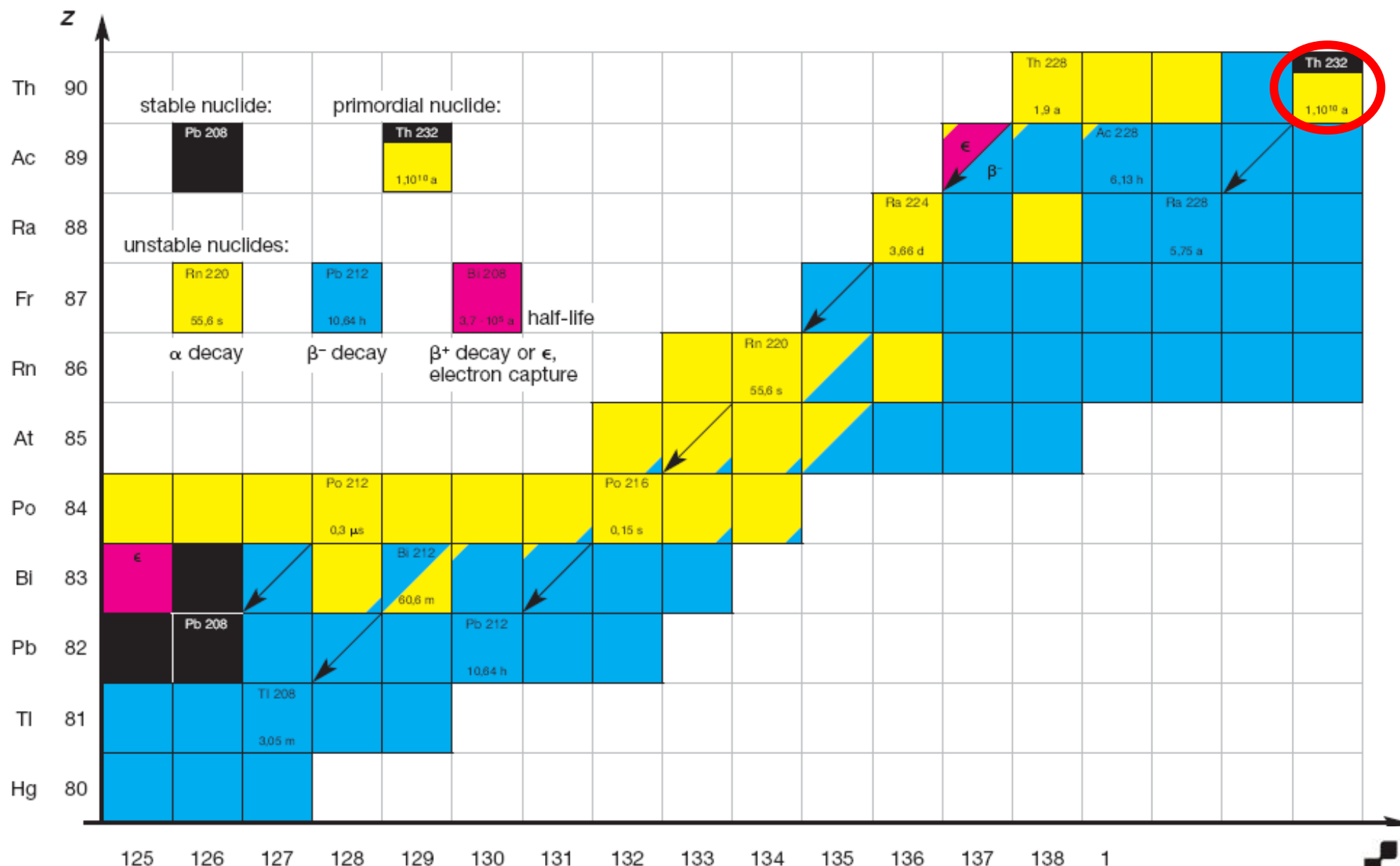


Colour  $\leftrightarrow$  Decay Mode

- ➡ Only experimentally observed nuclides.
- ➡ Colour scheme based on the decay modes. Multiple decay modes indicated.
- ➡ Additional spectral data is also provided; half-lives, energies, abundancies, cross-sections, etc...



# Karlsruhe Nuclide Chart : Th232 decay chain





- ➡ Update information about the chart
- ➡ Additional translations: Romanian, Japanese, Korean and Italian (new ones are welcome)
- ➡ Dedicated page on Wikipedia

## THE KARLSRUHE CHART OF THE NUCLIDES

can be ordered from  
(bulk discounts are available):

Marktdienst Haberbeck GmbH  
Industriestraße 17  
32791 Lage (Germany)  
E-mail: [marktdienste@haberbeck.de](mailto:marktdienste@haberbeck.de)  
Phone +49 (0) 5232-6009-148  
Fax +49 (0) 5232-68445



# Nuclide Charts

- *An important tool for nuclear scientists*
- *Choice of the database & of the physics/colour scheme*
- *Huge advantage of Nucleonica giving access to all related information*
- *More information at [www.nuclides.net](http://www.nuclides.net)*

